SUBCHAPTER C - APPLICATIONS

PART 520 - SOIL AND WATER RESOURCE DEVELOPMENT

SUBPART A - EROSION AND SEDIMENT CONTROL

520.00 General.

(a) Effective erosion and sediment control requires a comprehensive system of engineering and cultural practices applied to the land for the specific purpose of controlling erosion and preventing excessive sediment accumulation. Federal and State laws, regulations, and executive orders have emphasized the need to conserve natural resources and to improve the quality of the environment. Erosion and sediment control systems address this need.

(b) Erosion occurs in many areas other than cropland. Construction sites, parks, playgrounds, roads, and urban areas are major sources of erosion. SCS is often asked for assistance in the planning, design, and construction of erosion and sediment control systems.

520.0l Minimizing erosion and pollution during construction.

(a) SCS is to minimize erosion and pollution in construction operations carried out under all programs. The need for pollution abatement must be determined for each site by evaluating the pollution hazard and its relation to the pollution tolerance or standard for the area in question. A review of State and local standards established as a result of the Water Pollution Control Act (as amended) should be used in determining the control necessary for special sites.

(b) Pollution control measures are to be included as a part of all construction carried out by SCS through formal contract or force account procedures.

(c) Pollution control measures are to be included as a part of all construction carried out by local organizations, through formal contract or otherwise, with SCS providing the engineering design, installation services, or both.

(d) All construction that is carried out by local organizations, either with their own engineering organization or with engineering consultants retained by them with SCS financial assistance, must comply with the intent of this policy but not necessarily with the specific details.

(e) In addition, engineering done by SCS for individuals and groups is to include satisfactory control measures.

(f) Because the measures required to control erosion and pollution may be unique to each site, new national guide specifications on such measures will not be established. States are to develop plans and specifications for the specific measures that are required for individual structures or sites or by using appropriate National Guide Specifications (NEH-20) or the National Handbook of Conservation Practices.

(g) Field surveys and site investigations are to include the information required to properly plan and design the measures needed to provide an acceptable degree of pollution erosion control for a site. Requirements for vegetative control measures are to be included along with structural measures.

(h) Requirements for erosion and pollution control measures must be clearly outlined in construction contracts. In many contracts these requirements can be included in the items of work and construction details section.

(i) Control measures included in construction contracts are to be discussed with the contractors at the prebid site showing and at the preconstruction conference.

(j) If special pollution problems arise during construction or if special measures not in the contract are needed, they are to be brought to the attention of the contracting officer for contract modification or other appropriate action.

(k) In preparing plans and specifications for structures or projects at locations where pollution tolerances may be exceeded, consider that:

(1) The area and duration of exposure of erodible soils should be reduced to the greatest extent practicable.

(2) Soils should be protected by using temporary vegetation or mulch or by accelerated establishment of permanent vegetation. Segments of work should be completed and protected as rapidly as construction schedules allow.

(3) The rate of runoff from the construction site should be mechanically retarded and the disposal of runoff should be controlled.

(4) Sediment resulting from construction should be trapped in temporary or permanent debris basins.

(5) Dust should be kept within tolerable limits on haul roads and at the site by applying water or other dust suppressors.

(6) Temporary bridges or culverts should be used where fording of streams is objectionable. Borrow should not be taken from areas where pollution from the operation is inevitable.

(7) Temporary measures should be used to keep erosion under control if construction is suspended for any appreciable length of time.

(8) Protection against pollutants such as chemicals, fuels, lubricants, sewage, etc., should be provided.

(9) Construction should be timed to avoid rainy seasons if practical.

(l0) Sanitary facilities should not be located over or adjacent to live streams, wells, or springs.

(11) Grass or brush fires should be prevented.

SUBPART B - FLOOD PLAIN MANAGEMENT

520.10 General.

Flood plain management is essential in the development of plans to reduce flood damages. Flood plain management requires the application of sound engineering principles.

520.11 Scope.

Flood plain management includes structural and nonstructural measures to reduce flood damages and is subject to the rules and regulations in 7CFR 650.25. Flood plain management assistance programs are described in l50-Part 506.

520.12 Description.

(a) Flood plain management is a program designed to obtain a given set of objectives for reducing flood damage. A flood plain management system should:

(l) Avoid direct or indirect support of flood plain development if there is a feasible alternative;

(2) Insure that the risk of a flood plain use is compatible with the degree of flooding expected;

(3) Protect human safety, health, and welfare; and

(4) Preserve and restore important environmental values.

(b) he methods for meeting flood plain management goals may be grouped under those for "people control" that reduce the effect of and susceptibility to flooding and those for "flood control" that reduce the amount of flooding. Flood plain management includes both structural and nonstructural measures.

520.13 Types of measures.

(a) Structural measures such as dams, channels, and diversions that are included to modify the flood water are generally well understood and are not described in this subpart.

(b) Nonstructural measures include the following:

(l) Acquisition includes purchase in fee title or suitable easements for the purpose of precluding future uses that would be incompatible with the expected degree of flooding or setting time limits for which inhabitable buildings can be used.

(2) Relocation of residential, commercial, industrial, and other buildings to flood-free areas to reduce or prevent flood damages.

(3) Regulation includes actions by local government entities through zoning, building codes, etc., to keep land use compatible with the expected degree of flooding. Regulation may apply to a floodway, which is the part of the flood plain that can contain a flood without causing an excessive increase in the elevation of the water surface. Usually this increase is l foot but some communities have a lower limit. The flood fringe is the area of the flood plain below the increased elevation (as defined above) and outside the floodway. The floodway is to remain unobstructed. Development is normally allowed in the flood fringe is structures are elevated above the area of flooding. In these areas the need for ingress and egress as well as the possibility of larger floods occurring must be considered.

(4) Floodproofing consists of modifications of existing structures, their sites, and building contents to reduce the probability and adverse effects of water entry. Some general guidance on floodproofing is in Technical Release No. 57.

(5) Flood warning systems and emergency action plans provide information on the time of occurrence and magnitude of flooding to be expected. Features could include visual observations, stage recorders in streams, precipitation data in the uplands, continuous or periodic data collection, manual or automatic relay systems, flood warning markers, etc. The degree of sophistication varies with the needs of the local community and the hydrologic characteristics of the area. The warning system needs to be integrated with the emergency action plan. Both must be compatible with the local situation. It is desirable to provide a warning time of several hours--perhaps 10 to 12 hours. However, if only a 1- or 2-hour warning is possible, the emergency plan must be implemented with due consideration to the short time available.

(6) Information and education are essential to any flood plain management system. the development of needed technical information and its dissemination to the public, especially local government officials, planners, and affected landowners, are essential. Included are flood warning markers that designate, on the ground, areas subject to flooding so that the hazards can be recognized. these could be referenced to historic floods, percent chance floods, or the floodway location.

(7) Flood insurance is a method of spreading economic loss over time and among a relatively large number of people. It does not directly reduce damage.

(8) Flood emergency measures include contingency and emergency floodproofing that can be completed in anticipation of flooding. It should be recognized that one of the functions of overall flood plain management is to reduce the need for this type of emergency action.

520.14 Risk to life and property.

The risk to human life and property is considered in evaluating various flood plain management alternatives. Although risk is difficult to measure, certain physical parameters can be used to assess the potential risk for each structure.

(a) Frequency of flooding determines the probability of occurrence. The l00-year frequency flood (l percent chance in any l year) is the minimum acceptable if there is risk to human life. For certain critical facilities such as hospitals, schools, nursing homes, utilities, and facilities for producing or storing volatile, toxic, or water-reactive materials, the effects of the 500-year frequency flood should be considered.

(b) Depth of flooding is a crucial factor. Some areas may tolerate depths of from l to 3 feet without being considered hazardous to life.

(c) Estimated warning time for evacuation may be significant.

(d) Velocities should be considered either along or in combination with depth and other parameters.

(e) Combinations of depth (in feet) and velocity (in fps) can be used as indicators of risk. Products of 5 or 7 have been used as a limit for "people safety" and values of l5 or 20 for "structural safety."

(f) Duration of flooding may be a significant factor for some agricultural crops.

(g) Other factors may also be available to evaluate risk.

520.20 General.

(a) Dams are essential to soil and water resource development. Controls to insure safety of dams are needed to protect life and property.

(b) Uniform high quality standards must be used in planning, design, and construction of dams to ensure consistently safe, efficient performance.

520.2l Definition and classes.

(a) As used in this manual, a dam is an artificial barrier, together with any associated spillways and appurtenant works, that does or may impound or divert water.

(b) Storage is the capacity of the reservoir in acre-feet below the elevation of the crest of the lowest open channel emergency spillway or the elevation of the top of the dam if there is no open channel emergency spillway.

(c) Overall height is the difference in elevation in feet between the top of dam and the lowest elevation at the downstream toe.

(d) Effective height is the difference in elevation in feet between the lowest open channel emergency spillway crest and the lowest point in the original cross section on the centerline of the dam. If there is no open channel emergency spillway, the top of the dam becomes the upper limit.

(e) Dams are classified according to the potential hazard to life and property if the dam should suddenly breach or fail. Existing and future downstream development including controls for future development must be considered when classifying the dam. The classification of a dam is determined only by the potential hazard from failure, not by the criteria.

(l) Class (a)--Dams in rural or agricultural areas where failure may damage farm buildings, agricultural land, or township and country roads.

(2) Class (b)--Dams in predominantly rural or agricultural areas where failure may damage isolated homes, main highways, or minor railroads or interrupt service of relatively important public utilities.

(3) Class (c)--Dams where failure may cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, main highways, or railroads.

(f) Some dams have greater significance than others because of their potential for affecting public safety. The public concern for safety of dams is often identified with the size of dam and reservoir. Because dams, even though small, initially may present no hazard in terms of loss of human life, their degree of hazard can change as a result of downstream development. Because of this and the need to manage an overall SCS program for dam safety, a national inventory of SCS assisted dams is to be maintained by the Director of Engineering. Each state conservationist is to develop the inventory in the state. Procedures for developing and maintaining the inventory are contained in 290-300. The following dams are to be included in the inventory and are considered as SCS inventory dams.

(l) All class (b) and (c) dams;

(2) Class (a) dams more than 6 feet in overall height and with a storage capacity of 50 acre-feet or more; and

(3)Class (a) dams with an overall height of 25 feet or more and a storage capacity of more then l5 acre-feet.

520.22 Design criteria.

(a) Class (a) earth dams with a product of storage times the effective height of the dam of less than 3,000 and with an effective height of the dam of 35 feet or less are to meet or exceed the requirements of Practice Standard 378, Pond (NHCP).

(b) Class (a) earth dams whose product of storage times the effective height of the dam is 3,000 or more; those more than 35 feet in effective height; and all Class (b) and (c) dams are to meet or exceed the requirements of Technical Release No. 60.

(c) Dams of materials other than earth are to comply with the applicable portions of Practice Standard 378 and Technical Release No.60. Other features are to meet or exceed the requirements as stated in other applicable SCS standards.

520.23 Classification.

(a) Classification of dams is to be determined at the time of inventory and evaluation and verified immediately prior to construction. The person having the engineering job approval authority (50l.04 of this manual) is responsible for the classification. For Class VII and VIII jobs, both the state conservation engineer and the head of the NTC engineering Staff are to concur in the classification. They are jointly responsible for the classification.

(b) Documentation of the classification of dams is required. Documentation is to include but is not limited to location and description of dam, configuration of the valley, description of existing development (houses, utilities, highways, railroads, farm or commercial buildings, and other pertinent improvements), potential for future development, recommended classification, and signatures of those performing and concurring in the classification. It is also to include results obtained from breach routings, if breach routings are used as part of the classification process.

(c) If there are indications that any existing dam is misclassified, including changes resulting from downstream development, proposals for reclassification are to be submitted to the state conservation engineer for action. If the state conservation engineer approves, the dam is officially reclassified. When this occurs, the case file is to be documented, proper notification made, and the updated information added to the inventory of SCS assisted dams. For further guidance see 440-300.

520.24 Special considerations.

(a) Most of the requirements in Practice Standard 378 and Technical Release No. 60 are stated as maximum and minimum limits and are not to be construed as satisfactory criteria for all dams.

(1) Special considerations are to be given to dams in series, to those with drainage areas of more than 10 square miles, and to those located in regions of high earthquake hazard.

(2) Class (a) dams for municipal or industrial water supplies are to be designed with minimum criteria equivalent to that for Class (b).

(3) Class (c) dams and those with permanent storage are not to be constructed over an active fault without the concurrence of the Director of Engineering.

(b) Local experience, State laws and regulations, site conditions, or other special features may require the use of more stringent criteria to insure a satisfactory dam.

520.25 Clearing reservoirs.

(a) Reservoir areas are cleared to facilitate the movement of water; to provide for the proper functioning of outlets and spillways; to provide convenient access to dams and related structures for operation and maintenance; and to comply with State and local laws and regulations.

(b) The following minimum standards are to be used to determine the clearing required for reservoir areas:

(l) Dry dams. Minimum requirements include:

(i) Reservoir areas are to be cleared to a distance of 200 feet upstream from the principal spillway inlet except that no clearing is necessary above the elevation of the top of the inlet.

(ii) Areas immediately upstream from emergency spillways are to be cleared to the extent required to permit spillways to function properly.

(2) Dams that retain water in a reservoir. This includes dams in which space is allocated for sediment storage and dams that provide water storage for beneficial use. Minimum requirements include:

(i) Reservoir areas are to be cleared at least up to the elevation of the crest of the lowest ungated principal spillway inlet.

(ii) Less clearing may be approved for a specific site if the structure incorporates fish and wildlife features and the sponsor or owner requests that the area not be cleared, or if the cost of clearing is disproportionate to the other costs of the structure and lack of clearing will not interfere with the functioning of the reservoir. The minimum area cleared must extend the full length of the dam for a distance of 400 feet upstream from the principal spillway and must include the area upstream from the emergency spillway to the extent required for it to function properly.

520.26 Independent reviews for dam safety.

(a) Definition of an independent review. An independent review is an examination and evaluation of procedures used and decisions made during the design and construction of a dam by peers from outside SCS or from an organizational unit other than the one responsible for the design and construction. "Design" is used here in the broad sense as defined in 511.02.

(b) Purpose of an independent review. Independent reviews are made to insure that design and construction procedures and decisions reflect safety considerations as well as economy. Dam safety considerations are directly related to the potential for loss of life, damage to valuable property, or disruption of transportation and utility facilities if the dam fails. The classification of dams is determined by the potential for such losses and damage (see 520.2l). The reviewer is to determine whether the methods of analyses are appropriate and the assumptions are justified by the site conditions, as well as whether the results are reasonable. An independent review is not a substitute for expertise needed during design and construction.

(c) Design reviews. Design reviews are made as established in 511.05. Designs that are coapproved are to be reviewed by the coapproving office as well as the office with primary responsibility. If the office responsible for the design and coapproving office collaborate on the design, the review made for coapproval purposes is not considered an independent review. The design review for coapproval purposes can be considered an independent review only if the coapproving office had little or no role in the design.

(d) Determination of need for an independent review. All dams proposed for construction, modification, or repair are to be evaluated by the state conservation engineer to determine the need for an independent review. For class (c) dams, factors to be considered are the degree of hazard, size of dam, reservoir volume, complexity of site geology, complexity and margin of safety reflected by the design layout and construction methods, and any other unique condition or complexity noted during planning, design, or construction. To determine the need for an independent review for all other dams, consider site complexity, unique design features, or other special conditions requiring special expertise. The need for an independent review is to be determined during preliminary design (See 5ll.02(c)). For projects, the determination is to be made during planning when the preliminary design is prepared.

(e) The procedure for establishing an independent review.

(l) The state conservation engineer and the head of the NTC Engineering Staff are to make a joint recommendation to the state conservationist on whether an independent review is needed. The recommendation is to be supported by a justification statement and include a brief description of the site, the proposed structure layout, composition of technical specialists making up the view team, and other essential data. This is to become a part of the design folder. An independent review may be initiated at any state of design or construction.

(2) The state conservationist is responsible for implementing the independent review. He or she is to advise the Director of Engineering of the plan to conduct an independent review.

(3) When an independent review is recommended, the state conservationist is to request from the NTC director a list of employees and others qualified to make the review. The Director of Engineering is to be consulted in compiling the list and provided a copy of the list.

(4) The state conservationist is to make the necessary arrangements for appointing the review board and assigning their responsibilities. If the board is composed of more than one member, a chairperson is to be designated.

(5) The review board is to be permitted to make reviews at the times they determine necessary. The review assignment is to require evaluation until construction is completed.

520.27 Emergency action plans--class (c) dams.

(a) Applicability. An emergency action plan is to be prepared for each class (c) dam for which SCS provides technical or financial assistance. The state conservationist is to determine that an emergency action plan is prepared prior to the initiation of construction.

(b) Inundation maps. SCS is to provide appropriate inundation maps. These maps define areas that would be affected in an emergency situation and provide other appropriate information. The inundation areas to be delineated on the maps are to show the following two conditions:

(l) Outflow from routing the emergency spillway hydrograph (or larger hydrograph) through the spillways and downstream; and

(2) Discharge due to sudden breach of dam. Unless otherwise determined by the state conservation engineer, the conditions at the time of breach may be water level in the reservoir at or above the crest elevation of the lowest open channel emergency spillway and "nonstorm" conditions downstream of the dam.

(i) For dams in series, an evaluation should be made to determine if breach of an upstream dam would endanger a downstream dam. If the downstream dam is endangered, the breach inundation map should be based on multiple failure.

(ii) For dams not in series but which would affect a common downstream area, it is usually adequate to consider the failure of each dam individually unless special circumstances would warrant multiple failures.

520.28 Potential impact area--class (a) dams of inventory size and all class (b) dams.

(a) Applicability. for each class (a) dam of inventory size and for each class (b) dam, the area that could be inundated in event of a breach is to be determined. This is done as part of the classification (520.2l(e)) and its ducumentation (520.23(b)).

(b) Requirements. (l) The potential impact area may be determined by performing breach routings or by other methods._

(2) The potential impact area is to be clearly described by the use of maps and/or narrative description. In addition to the description of the area, precautions s to future development within the area are to be included. These precautions may be specific (e.g., if based on breach inundation studies) or may point out the need for breach routings in the future if development is ever considered. The landowner or sponsor should be made aware of the potential impact area as early as practicable and before expending significant resources in design.

(c) Distribution. (1) As early as practicable but no later then initiation of construction, the state conservationist is to officially transmit the description of the potential impact area and precautions on development to the owner or sponsor. It is the responsibility of the owner or sponsor to transmit the description of the potential impact area and precautions on development to:

(i) The local land use control agency or county,

(ii) The State agency responsible for dam safety, and

(iii) The conservation districts and others as appropriate.

(2) If requested by the owner or sponsor or if the owner or sponsor fail to act, the state conservationist is to make the specified notification.

SUBPART D –OPEN CHANNELS

520.30 General.

(a) Channels are used for a variety of purposes. Excessive bank erosion and bed degradation and/or excessive sediment accumulation may cause channels to function improperly. It is important that channels be maintained to insure satisfactory performance for their anticipated life.

(b) The design of stable channels requires many analyses. Some of the principles are complex and must be applied with adequate data and sound judgment. The policy in this subpart results from sound SCS experience, and its application will result in sound channel design.

520.3l Definition.

An open channel is either a natural or a manmade channel, excavated in earth or built of structural components, in which water flows with a free surface.

520.32 Design criteria.

(a) Open earth channels are to meet or exceed the requirements of Practice Standard 582, Open Channel (NHCP) and Technical Release No. 25. Exceptions for small drainage areas or other practices are noted in the Standard.

(b) Open channels of material other than earth are to comply with the applicable portions of Practice Standard 582 and Technical Release No. 25. Other features are to meet or exceed the requirements as stated in other applicable SCS standards.

520.33 Special considerations.

(a) Channel measures installed for fish and wildlife habitat generally include deflectors, channel sills, and other devices that may be constructed of permanent materials such as concrete or semipermanent materials such as wire, logs, rock, and brush. See Fish and Wildlife Service - Soil Conservation Service Joint Channel Modification Guidelines.

(l) Measures for fish and wildlife habitat may be divided into two categories: Permanent measures designed according to engineering standards and requirements and semipermanent or temporary measures that do not meet these standards.

(2) Fish habitat improvement measures are to be installed so that they do not interfere with overall channel flow in a manner that will contribute to deterioration of the channel cross section.

(3) Biologists are responsible for approving the design of temporary fish habitat improvement measures. Engineers are to review the planned measures to evaluate their effects on channel design, operations, and maintenance.

(4) Engineers are to approve or prepare the design of permanent measures to insure that the anticipated operation is compatible with the planned overall functioning of the channel and in accordance with identified biological needs.

(5) If a watershed work plan includes measures described as temporary, the work plan must include a statement that these measures are temporary and will require frequent maintenance and replacement by the sponsors.

(b) Landscape architecture is an important factor of an open channel. Installed channels are to comply with the principles in Technical Release No. 65.